Seattle - King County
Department of Public Health

DAVID SOLET, PhD
Assistant Chief
Epidemiology, Planning & Evaluation

999 3rd Avenue
Suite 1200
Seattle, WA 98104

(206) 296-2782
FAX: (206) 205-5314
e-mail: david.solet@metrokc.gov

KCSlip4 35057

SEA401602

DEPARTMENT OF HEALTH & HUMAN SERVICES

Public Health Service

Agency for Toxic Substances
and Disease Registry
Atlanta GA 30333

February 9, 1998

Mrs. Lorna Dove
Project Manager
Georgetown Crime Prevention and Community Council
P.O. Box 80021
Seattle, Washington, 98108

Dear Mrs. Dove:

Thank you for completing the "Agency for Toxic Substances and Disease Registry (ATSDR) Screening Criteria for a Proposed Exposure Investigation," dated December 9, 1997 and for including additional information related to the Georgetown Community. Your presentation of neighborhood concerns by telephone conference call on January 8, 1998 was particularly helpful to ATSDR and Washington State Department of Health (WSDH) staff in understanding the concerns of the Georgetown Community.

ATSDR staffs have carefully reviewed, analyzed, and interpreted some of the air data provided by you and collected by EPA, Boeing, and two Universities within your State (Attachment; ATSDR AROA dated January 27, 1998). We have concluded that there are several areas where ATSDR can offer support with the public health activities:

- *ATSDR, although a non-regulatory agency can provide recommendations to the State and EPA in order to protect public health. As listed in the attached AROA, ATSDR has recommended additional air sampling in the Georgetown Community, and will request that the appropriate environmental agencies perform the sampling needed to better evaluate emissions from Boeing Field.*

- *An ATSDR Region X representative and an ATSDR Industrial Hygienist, with expertise in air issues, will perform a site visit to tour the community and gain a better understanding of exposure pathways and contaminant sources.*

- *ATSDR will provide technical assistance to the WSDH which has agreed to develop a written health consultation to perform a thorough evaluation of existing data, more completely define issues which need to be addressed, and determine what further actions are needed.*

- *The WSDH and ATSDR will evaluate a recently completed need assessment conducted for the adjacent South Park Community to identify additional concerns to be addressed within both communities.*

- *ATSDR Region X and the WSDH will meet with representatives of the Georgetown and South Park Communities to assist in determining additional specific actions that can be taken on behalf of both communities.*

For further assistance with questions regarding ATSDR and WSDH involvement in your community, please contact Richard Kauffman, Region X Representative, Seattle, Washington (206) 553-2632.

Thank you for your assistance in initiating ATSDR's involvement in the public health issues of your community.

Sincerely yours,

Susan W. Metcalf

Susan Metcalf, M.D.
Chief,
Exposure Investigations Section
Division of Health Assessment
and Consultation

cc: Richard Kauffman, ATSDR Region X
Sharon Fleetwood-Williams, ATSDR

Name: Georgetown Crime Prevention
LOG #: 98-1042

ATSDR Record of Activity

ROUTING:
J. Abraham E. Skowronski
FILE

UID #: GAZ5 Date: 12/18/97 Time: 7:30 am x pm _

Site Name: Georgetown Crime Prevention City: Seattle
Cnty: Kings State: WA

CERCLIS #: _____ Cost Recovery #: 0P10 Region: 10

Site Status (1) _ NPL _ Non-NPL _ RCRA _ Non-Site specific _ Federal
(2) _ Emergency Response _ Remedial _ Other: petition

Activities

_ Incoming Call	_ Public Meeting	_ Health Consult	_ Site Visit
_ Outgoing Call	_ Other Meeting	_ Health Referral	_ Info Provided
_ Conference Call	x Data Review	_ Written Response	_ Training
x Incoming Mail	_ Other (technical assistance)		

Requestor and Affiliation: (31) Richard Kaufman, ATSDR X
Phone: (206) 553-1049 Address: 1200 6th Avenue, Suite 1930
City: Seattle State: WA Zip Code: 98104

Contacts and Affiliation

(31) James Walker (DHAC) (31) Lynn Wilder (DHAC)
(31) Gail Scogin (PRB) ( )

1-EPA	2-USCG	3-OTHER FED	4-STATE ENV	5-STATE HLT
6-COUNTY HLTH	7-CITY HLTH	8-HOSPITAL	9-LAW ENFORCE	10-FIRE DEPT
11-POISON CTR	12-PRIV CITZ	13-OTHER	14-UNKNOWN	15-DOD
16-DOE	17-NOAA	18-OTHR STATE	19-OTHR COUNTY	20-OTHR CITY
21-INTL	22-CITZ GROUP	23-ELECT. OFF	24-PRIV. CO	25-NEWS MEDIA
26-ARMY	27-NAVY	28-AIR FORCE	29-DEF LOG AGCY	30-NRC
31-ATSDR				

Program Areas

_ Health Assessment	_ Health Studies	_ Tox Info-profile	_ Worker Hlth
_ Petition Assessment	_ Health Surveilnc	_ Tox Info-Nonprofil	_ Admin
_ Emergency Response	_ Disease Regstry	_ Subst-Spec Resch	_ Other
x Health Consultation	_ Exposr Regstry	_ Health Education	

Narrative Summary:

Richard Kaufman, the Region X representative of ATSDR and James Walker the Project's lead of contact requested the Exposure Investigation Section to provide a technical review of the data collected by Oregon Graduate Institute, Washington State University, and others to evaluate the public health impact of emissions associated with the operations at the Boeing field in in Kings County, WA.

The technical review included but was not limited to the following documents:

1 jet engine run logs from 11/96 - 2/97
2 wind rose from Boeing field
3 summa canister results of 12/18/96
4 summa sampling results of 12/30/96
5 summa sampling results of 7/97
6 summary of SO2, NOx, and aldehydes from 3/97
7 summary of several air sampling events by the Department of the Environment (DOE) 3/93

Action Required/Recommendations/Info Provided:

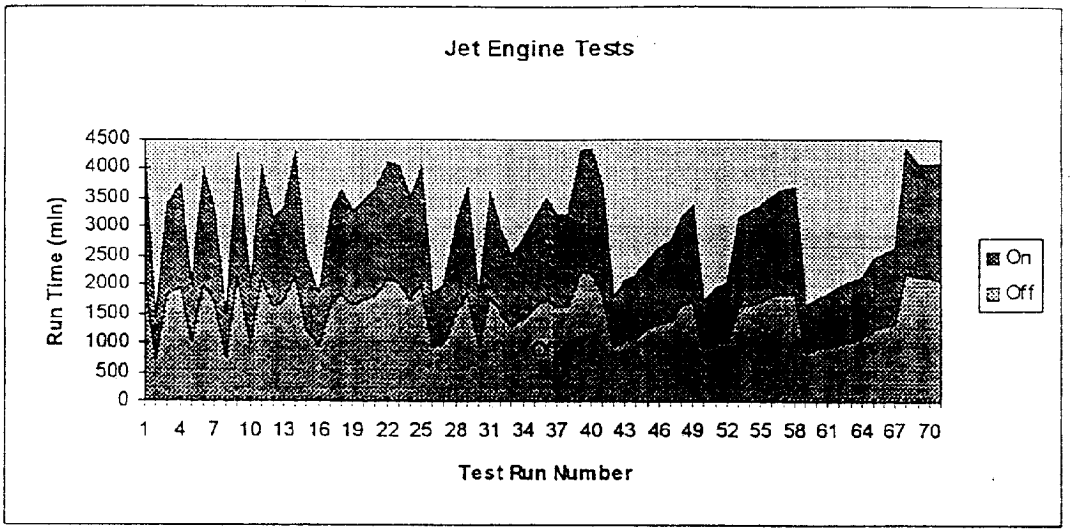
There is insufficient data to define a fingerprint of the background ambient air conditions surrounding the Boeing field.

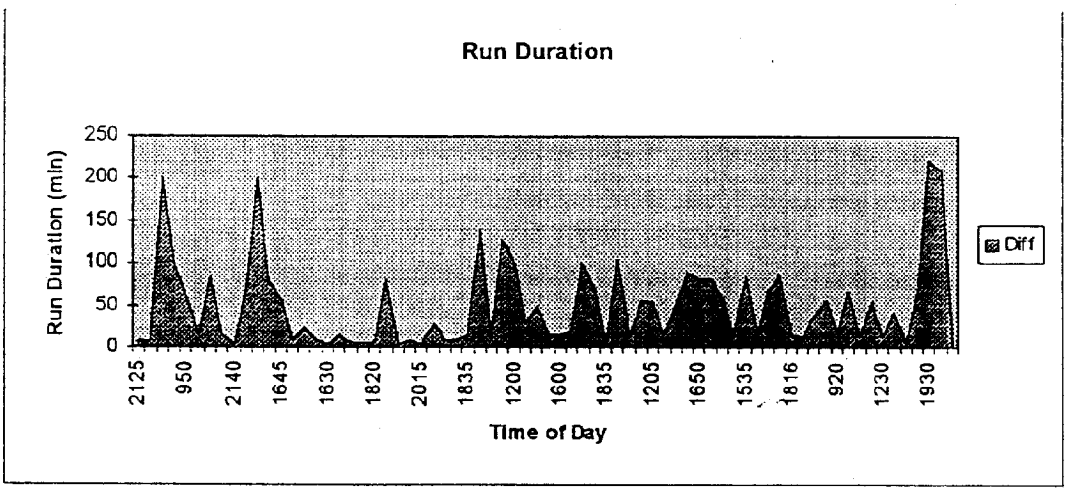
Additionally, there is limited data defining the typical conditions that occur as a result of the impact of the Boeing field operations.

However, the sampling that occurred during the test runs of the 777 while the samplers were downwind does indicate elevated levels of VOCs for periods when testing is performed. How this information can be extrapolated to determine if the day to day operations impacts the health of the residents of the adjacent community is difficult.

Logs provided by Boeing field are available and may serve to give an understanding of the potential aircraft emissions due to testing alone. The following two charts illustrate the time and intensity of the jet engine test logs at Boeing field for a 60 day period. The first chart indicates the time that the engines are run for testing. The height of the lower (light grey) region illustrates the time of day when the operations were initiated (on a 24 hour-clock) and the height of the darker region illustrates the duration of the run (in terms of completion time). The second figure illustrates the frequency of the testing; it also lists the time of operation and the and the length of the runs (in run-time minutes). Together they give a 60-day snapshot of the "pulse" of the stationary engine run activities.

A summary of the run logs for the 60 day period indicates that the engine testing usually occurs during the five-day work week and that engine testing does not usually occur on holidays. The logs also show that the testing is done once or twice per day for run times usually between 20 - 120 min (each run).





Meteorological data collected at the Boeing field, indicates that the prevailing wind comes from the south (over one third of the time). This places the communities to the north of Boeing field in the region of the highest impact from the operations on site.

Background Data (?)

In July of 95, eight samples were collected in the Georgetown community at different times. Winds were variable and originated frequently from the east and north during these times and the ambient

air concentrations of benzene varied from 1.7 to 4.1 ug/m3. 1,3-Butadiene was not reported for this event. These values may be useful as indications of possible background concentrations.

Several other sample results for July are reported but their locations and analysis are not identified. These samples report benzene that ranges between 2.77 - 11.58 ug/m3. 1,3-Butadiene was not reported for any of these events. Meteorological data was also not provided for any of the sampling episodes.

Downwind Data (?)

During 12/18/86 the wind was originating from the southeast during the sampling period. The results of the samples collected at this time indicated elevated concentrations of benzene (49.8 ug/m3) and 1,3-butadiene (5.9 ug/m3) near the source and elevated downwind concentrations of benzene (30.4 & 44.6 ug/m3) and 1,3-butadiene (4 & 4.7 ug/m3). Unfortunately due to the source and wind configurations, no upwind stations were available to evaluate background concentrations.

Due to meteorological data collected during the sampling events, an argument could be made that the dispersion conditions could have been less conducive to dilution and therefore higher concentrations would have been detected for the same duration of the sampling event. For example, if the same conditions occurred at night the measured concentrations detected at the downwind sampling locations could be 3-times higher. Conditions similar to the 12/96 sampling event occur about 28% of the time. Therefore, the sample results may be sufficient for determining potential exposures to typical short-term episodic conditions.

Conversely, arguments can be made after viewing the results of a single sample collected on 12/30/96. This single sample brings question to the cause and effect of the data collected on 12/18/96. During the 12/30/96 sampling event the wind was calm but did originate from the southeast earlier in the day and resumed from the southeast later. During this test the concentration of benzene detected at the residence where a single sample was collected was 5.6 ug/m3 and 1,3-butadiene was not detected. No other samples were collected on this day. These conditions are similar to those experienced on 12/18/96 with the exception of time of day, evening as opposed to morning, which may translate into an atmospheric stability issue.[1] The different time periods may also produce different background concentrations due to vehicular traffic.

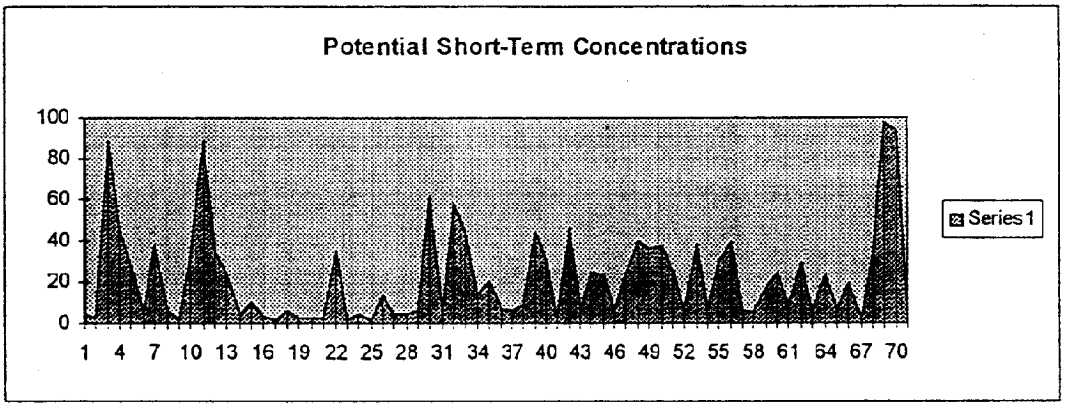
Two of the samples collected during the 12/18/96 test were used as typical downwind test conditions during stationary jet testing. Long-

---

[1] F. Pasquill, *Atmospheric Diffusion*, Wiley and Sons, ISBN: 0 85312 015 3, New York, p 375, 1974.

term exposures need to be extrapolated from this data and therefore estimates using the operations log need to be applied.

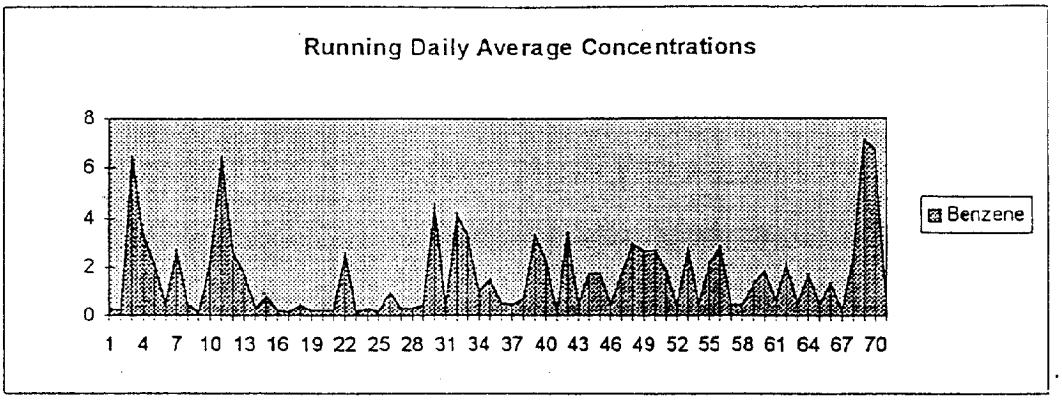
Assuming that the typical jet engine produces the same concentrations as those measured in the community during the testing of the 777, ratios were made using the 60-day engine logs to determine concentrations. Due to the lack of sufficient downwind data (three short-term samples) a value of 40 ug/m3 (within the range) for benzene and 4 ug/m3 for 1,3-butadiene were selected as typical of downwind (community) concentrations during testing. To follow is an estimate of the daily concentrations (in ug/m3) in the community due to the impact of episodic emissions.



The average downwind concentrations across all of the above illustrated short-term events is 22 ug/m3. The corresponding value for 1,3-butadiene is 2 ug/m3.

These values were then averaged in with the expected periods of no activity to create an average daily concentration (essentially averaging the expected concentrations during the test run with the remainder of the days hours of "clean" air). These values are illustrated below.

Name: Georgetown Crime Prevention
LOG #: 98-1042



These results indicate the running average daily concentrations for 71 tests during two months due to emissions from Boeing field's activities alone. The total long-term impact of these activities are projected to raise the ambient air concentrations of benzene by 2.2 ug/m3 (and 1,3 butadiene by 0.2 ug/m3).

Below is a simple calculation of the air-pathway carcinogenic risk associate with a 70 year exposure to the projected ambient concentrations of benzene and 1,3-butadiene due to engine testing.

• benzene	8.3e-6 x 2.2 =	1.8 e-5	(A-leukemia)
• 1,3-butadiene	2.8e-4 x 0.2 =	5.6 e-5	(B2-thyroid)
• Total for 2		7.4 e-5	

Although these levels are near the background levels they do offer some increment of risk. Since the above values may be higher due to meteorological conditions, contribution from other operations, and contribution from other sources, it is a concern of ATSDR. The agency also has a concern for the other VOCs that are elevated but do not link as well to the emissions during the operations (as the two listed above). Additionally, ATSDR has a concern for products of combustion.

Conclusions

ATSDR recommends that the appropriate State and Federal environmental agencies be contacted and informed of the suspected ambient air concentrations that are a result emissions from site operations at the Boeing field. ATSDR anticipates that this issue falls under the state's Air Toxic Program; both 1,3-butadiene and benzene fall under Title III of the Clean Air Act Amendments and should be regulated under the facility's permit to operate.

Additionally, ATSDR recommends that appropriate sampling is conducted using simultaneous sampling at up and down wind locations to determine where the emissions originate. ATSDR recommends that VOCs and Semi-

VOC sampling methods are used simultaneously.

ATSDR recommends short-term (during the run) and long-term (24-hr) sampling to be conducted to ensure that the appropriate exposures can be estimated.

The results of the sampling may be used to better evaluate the long-term exposures to the compounds emitted during jet engine testing thereby assisting other agencies to make risk management decisions via: 1) ensuring that the tests are done during particular hours; 2) limiting the test duration; 3) not allowing the tests to be conducted under certain meteorological conditions; 4) limiting the frequency of testing.

ATSDR Action Items

- notify environmental agencies of findings;
- request environmental agencies to collect appropriate samples;
- request help from environmental agencies on other air issues;
- evaluate risk of appropriate samples;
- project risk from different operating conditions

Signature: _____ Date: 1/29/98
Gregory M. Zarus

Concurrence: Susan W. Metcalf Date: 2/17/98

Enclosures: Yes ( ) No (X); MIS entered: Yes ( ) No ( )

cc: J. Abraham (EICB)
R. Kaufman (ATSDR X)
J. Walker (EICB)
G. Scogin (PRB)
PERIS

Georgetown Crime Prevention and Community Council
P. O. Box 80021 Seattle, Washington 98108

February 18, 1998

Gregory M. Zarus
Agency for Toxic Substances and Disease Registry
Division of Health Assessment and Consultation
Mail Stop E32
1600 Clifton Road
Atlanta, GA 30333

Dear Greg,

Thank you for the review, analysis and interpretation of our data and resulting recommendations. I have some questions and concerns.

To identify general airport exhaust and Boeing Company testing exhaust signature, would lab analysis of a vial of jet fuel be useful? Were you able to identify more of the unidentified compounds on the Washington State University mass spec printout?

We are also severely impacted by SeaTac Airport operations that fly directly overhead. We maintain that SeaTac flight emissions are in the mixing zone and need to be included in an emissions inventory evaluating proposed increases in the KCIA Master Plan. Would sampling upwind be in the suburbs several miles away? The State Department of Ecology has sample data for the suburbs. It is difficult to take an "upwind" sample when it is a moving object that spews pollution six miles wide on takeoff and twelve miles wide for landings.

Last numbers information that I have regarding SeaTac Airport operations were approximately 400,000, Renton Airport, also just a few miles away, were at 200,000. KCIA operations for 1996 were 337,380 and for 1997 were 369,831, an increase of 32,451 operations in just one year. KCIA totals do not include the Boeing Company pre-delivery and certification operations on the ground.

The logs provided by the Boeing Company that I relayed to ATSDR were primarily the 777 test operations; other aircraft were listed unintentionally. Most of the other types of aircraft tested by Boeing were not listed, as their intent was only to supply the 777 logs. The logs were only a fraction of the total Boeing Company testing operations near us. The Boeing Company test operations are on leased land from King County International Airport (commonly known as Boeing Field) which is owned and managed by King County. I have tried to make it clear to the Boeing Company, KCIA Management and

local agencies that we are concerned about the total emissions impacting our neighborhood.

FAA confirms that the manufacturing pre-delivery Boeing Company operations are not under FAA jurisdiction and are under local jurisdiction. The Boeing representative states that their operations are exempt from permit requirements. Local authorities write that no laws are violated. Your comments on page 6 under Conclusions that this issue falls under the state's Air Toxic Program and Title III of the Clean Air Act Amendments and should be regulated under the facility's permit to operate is extremely important to our residential neighborhood and other surrounding neighborhoods. Thank you.

Is it possible to calculate the risk of increased cargo operations at King County International Airport? Increases have been without the benefit of an environmental impact statement. I am including airport documents that reflect the cargo operation increases from 11,192 in 1990 to 23,750 operations in 1997. Please note that a discrepancy appears in the airport manager's letter dated February 10, 1998 stating that 1995 cargo operations were 14,796. The Aviation Demand Forecasts Technical Paper dated November 26, 1996 states that 1995 cargo operations were 21,602—please use this number for 1995 operations if you can make cargo emission and risk calculations. We believe that to be the more reliable statistic.

Please note that the tons per operation have been increasing, reflecting the change to larger, noisier, more polluting aircraft. In 1994, KCIA had 10 acres for 16,584 cargo operations. The revised KCIA Master Plan proposes increasing to 25.8 acres for cargo operations but forecasts 17,700 cargo operations by the year 2015. We have no reason to believe that the projection of operations for 2015 is correct (since 1997 cargo operations of 23,750 were 6,050 greater than the number projected for 2015) and every reason to believe that increases will continue, reflecting the space available.

A revised KCIA Master Plan was released on February 2, 1998 that proposes extending the north end of the long runway and taxiway 800 feet closer to our Georgetown neighborhood. Aircraft taking off to the south will taxi to the end of this proposed extension, exhausting pollutants, noise and vibration 800 feet closer to us. KCIA has been in violation of the FAA Safety Clearance Area by 800 feet for the south end of the Runway and proposes fixing it by adding 800 feet to the north runway. FAA will approve a reduced runway length of 9,200 feet rather than the existing 10,000 feet now publicized by KCIA. According to FAA regulations, KCIA as soon as possible is required to DECLARE a 9,200 foot runway length. Not doing so is a violation and liability for KCIA. Can you help us fight this extension for health reasons?

On page 1, second paragraph, there is reference to "two Universities within your State." Actually, only Washington State University was in our state, the other, Oregon Graduate Institute, is located in Oregon. Could that be corrected to "two universities" period or similar verbiage? Thank you.

On page 2, bottom paragraph, there is reference to testing usually occurs during the five-day workweek and that engine testing does not usually occur on holidays. However, the good neighbor Boeing self-restricted hours publicized are between 5:30 p.m. and 8:00 a.m. and all day Sunday or holidays. A summary that I prepared shows that more than 46% of the run hours were in violation of Boeing Self-Imposed Restricted Hours. On 2/4/97 and 2/14/97 there were two simultaneous runs.

With increased market demands, Boeing has been testing off and on 24 hours a day, holidays or not. There is insistence that at idle there is no violation of noise ordinances and they are free to test as they wish whenever.

Frank Figg, Manager of Local Governmental Affairs for the Boeing Puget Sound Region, said at the KCIA Roundtable meeting on February 19, 1998, that not all of the aircraft delivered are delivered from this location. For instance, of the 48 a month Boeing aircraft deliveries, 29 are delivered here. He said this Research and Development Center is *The* Research and Development Center for the world.

On page 3, there is reference to samples taken in July of 96. The correct year was 1997. On the top of page 2, the document list did show the correct date as 7/97. I thought I had supplied location and meteorological data for those samples and have supplied it with this letter. (Samples 10 through 13 were taken in my front yard at 6435 Flora Ave. S., Seattle, WA 98108.)

There is a comment regarding the prevailing wind. Could you also include a comment regarding the lack of wind and air stagnation? Are you adjusting for "ZULU Time"? I understand that we are 7 hours ahead of the ZULU Time as recorded at Boeing Field Tower while we are at Daylight Savings Time and 8 hours otherwise.

On page 4, under Downwind Data the date 12/18/86 should be 12/18/96.

On page 4, there is reference to the 12/30/96 sample and vehicular traffic. There should be reference to the airport traffic differences. Please refer to field notes and the attached King County International Airport (Boeing Field) Traffic Record. Snow and ice had brought both vehicular traffic and airport traffic to a major slowdown after Christmas. On December 29, 1996, there were only 24 operations, seven of which were instrument operations. On the 30th, there were 390 operations of which 129 were instrument operations. Our sample was taken in the evening of December 30, 1996. As a comparison, on December 17th, there were 1,284 operations, of which 227 were instrument operations with 945 operations on December 18, 1996 of which 249 were instrument operations. Our sample was taken in the morning of December 18, 1996.

On page 6 there is reference in the first paragraph, second line, to Boeing "field's activities alone". The reference should be corrected to *some* of the Boeing *Company aircraft testing.*

In the next paragraph, there is reference to "engine testing." The Boeing representative has written that engine testing at KCIA by the Boeing Company is an anomaly. (It is not testing of the engine but testing of other parts of the aircraft, i.e., air conditioning, etc.) The Boeing log is labeled "Engine Run Log." Do you think the word "engine" should be deleted and the word "aircraft" substituted in that paragraph and again on page 7, second paragraph, second line? It is the same noise and pollution for either operation as far as we are concerned.

Can projections be made for increased cargo operations and the proposed 800 foot runway extension closer to our residential neighborhood?

At a recent airport meeting the airport manager, Cynthia Stewart, stated that Lorna Dove was circulating an erroneous report (the ATSDR report) regarding benzene in aircraft emissions. She said that she had talked to Puget Sound Air Pollution Control Agency and had been told that no such link or documentation existed. A Boeing engineer spoke up to say that Boeing has to add benzene as required by FAA for certification tests. He said that they would rather not because of concern for workers but it is up to FAA. He said that there is a "benzene tank" and disposing of excess amounts cost $15,000 a ton. I have a considerable library of reports for aircraft fuel compounds and aircraft exhaust component lists that include benzene. I will compose a freedom of information letter for written verification unless ATSDR can obtain the same for us. The specific aircraft on each new generation has longer hours for certification than other deliveries. On the Boeing Engine Run Log there were 15 hours, 51 minutes for the 777 WA001 which may have been used for certification. Would you comment please?

The airport manager has complained to EPA and others that I have not shared information and even directed a freedom of information request to EPA for copies of documentation that I had submitted to EPA. Apparently, I have both supplied too much and too little information to KCIA and Boeing.

A recent article by Karen West, Seattle Post-Intelligencer reporter, published Friday, February 20, 1998, states that the new generation 737-700 began its nine-month flight test program February 9, 1997. The total certification flight-testing effort involved four 737-700 airplanes, which completed nearly 1,600 flights; 2,220 hours of ground testing; and 2,000 hours of flight testing. The next generation 737 airplane family includes the 737-800, 737-600 and 737-900. Each of these airplanes will participate in separate flight testing and certification programs.

We are hearing that Boeing has threatened the County Executive with "we will leave the area" if Boeing isn't accommodated with the runway extension and freedom to test as they wish. Jobs, the economy, power and money have been and will continue to be more important than thousands of residents surrounding the airport. We hear about air scrubbing aircraft facilities in other areas of the country that reduce noise and pollution. We feel that reasonably available technology has not been used to protect workers or residents. A 10 foot "buffer" wall along the airport perimeter in residential areas (if there

is space) is proposed by KCIA in the Master Plan. The Master Plan consultant said that it could not be expected to reduce noise.

We have had several reliable, disturbing reports that aircraft over fueling at the KCIA have been corrected by stationary high power runs until the weight is reduced and it is safe to depart.

It would be very helpful if the risk assessment numbers were also explained in layman language. Could that be added, please?

We appreciate the page 7 comments for possible operational changes such as ensuring that the tests are done during particular hours, limiting the test duration, not allowing the tests to be conducted under certain meteorological conditions and limiting the frequency of testing. It will take a miracle to implement but we appreciate what you have done.

Thank you.

Sincerely,

Lorna Dove

Lorna Dove
Project Manager of Residential Neighborhood EPA Grant

Exhibit 6: KCIA Cargo Tonnage and Operations--Historical

Year	Cargo Tonnage	% Change	Cargo Operations	% Change	Tons/Operation (average)
1988	25,230	--	*N/A*	--	*N/A*
1989	27,530	9.1%	*NA*	*N/A*	*N/A*
1990	24,525	-12.3%	11,192	*N/A*	2.19
1991	26,328	7.4%	11,788	5.3%	2.23
1992	28,014	6.4%	13,514	14.6%	2.07
1993	31,031	10.7%	15,694	16.1%	1.98
1994	40,085	29.2%	16,386	4.4%	2.45
1995	81,160.5	102.5%	N/A	N/A	N/A

Source: KCIA Records

Note: Cargo handled at KCIA is about ten percent of air cargo handled at Sea-Tac Airport.

3.3.3 Previous Master Plan Forecasts

According to the 1986 Airport Master Plan, in 1984, 80% of freight tonnage was being carried by heavy jets, such as the 727s accounting for only 7% of the operations. It was assumed by the previous Master Plan that this trend would continue. This assumption led to an over-estimate of the number of cargo operations, which have remained small despite a larger than predicted growth in tonnage, as shown in Exhibit 7. Actual 1994 air cargo operations were less than half of the forecast, totaling 16,386 operations. The 1994 tonnage was nearly four times the 1995 forecast by the earlier Master Plan, for a total of 40,085 tons.

King County
International Airport
Department of
Construction & Facilities Management
P.O. Box 80245
Seattle, WA 98108
(206) 296-7380
(206) 296-0100 TDD
(206) 296-0190 FAX

February 10, 1998

Mr. Mike Rees
2820 - 42nd Avenue West
Seattle, Washington 98199

Dear Mr. Rees:

In a letter of February 3, 1998, you have requested information pursuant to public disclosure, including the number of flights diverted from Sea-Tac, the number of air cargo operations, and background concerning an FAA waiver for a non-standard runway condition. This information, to the extent that is available, is provided below.

We do not have the exact number of flights diverted from Sea-Tac to KCIA during the period 1994-1997. That data is aggregated in the air carrier category and is not reported separately. While we occasionally have flights from Sea-Tac diverted to King County Airport due to weather conditions, the number of these flights has diminished significantly in recent years because of enhanced and upgraded navigational equipment at Sea-Tac and on aircraft operated by Sea-Tac carriers. With this better equipment, weather is not such a factor and far fewer carriers find it necessary to divert to an alternate airport from Sea-Tac. We estimate that in 1997, fewer than thirty aircraft diverted to KCIA from Sea-Tac because of weather. In addition, because of our aircraft parking limitations, we have requested that some flights which would otherwise be diverted to us go to Portland or Vancouver instead.

With regard to the number of air cargo operations at KCIA between 1994 and 1997, our records indicate the following:

1994	8,292	landings;	16,584 operations
1995	7,398	landings;	14,796 operations
1996	11,688	landings;	23,376 operations
1997	11,875	landings;	23,750

This includes both large jet and smaller single and twin-engine propeller aircraft.

Regarding statements at the February 2, 1998 Roundtable meeting, there is not a waiver that "allows use of the 10,000 foot runway even though the runway apparently does not meet FAA requirements for a useable 10,000 foot runway." There is a non-standard condition related to the safety areas at each end of the large runway for which the proposed correction is a displaced threshold at the south. We do not have a formal "waiver", only recognition that the safety area is non-standard. The consultants have noted, however, that bringing the non-standard safety area into compliance is required by current FAA policy, which brought more attention to this issue in recent years.

If you have any further questions, please do not hesitate to let me know.

Sincerely,

Cynthia Stewart

Cynthia Stewart
Airport Manager

cc: Councilmember Larry Phillips
Councilmember Dwight Pelz
Prosecuting Attorney Norm Maleng

Exhibit 7.18

Air Cargo Operations Forecast

Forecast	Cargo Tonnage	Tons per Operation	Operations	Percent Increase	CAGR
Actual 1994*	40,085	2.45	16,386		
Low 2015	88,200	3.65	24,160	47 %	1.87 %
Medium 2015	102,400	3.65	28,060	71 %	2.59 %
High 2015	114,300	3.65	31,320	91 %	3.13 %

Source: TRA-BV Airport Consulting, 1996
* Actual 1995 operations provided by Airport Staff totaled 21,602, a 32% increase over 1994 levels. With 1995 air cargo volume totaling 81,161 tons, this translates to a 3.76 ratio of tons per operation, a 53% increase over 1994.

Air cargo operations forecasts were determined by calculating current tons per operation, developing a forecast of tons per operation with consideration for changing aircraft fleet mix, and then applying this tons-per-operation forecast to the low, medium, and high air cargo tonnage forecasts.

The current tons-per-operation ratio was determined by dividing the 1994 volume (40,085 tons) by the total number of air cargo operations (16,386). This resulted in 2.45 tons per operation ratio. Although this ratio has gradually increased from 1.9 tons per operation in 1989 to its current level of 2.45, the 1995 figures provided by the airport show a more significant increase in this ratio over the past year. Such change has been the result of the changing aircraft fleet mix. Larger air cargo aircraft are flying into King County International Airport and thus, more cargo is carried on each.

Cargo Fleet Mix

Cargo fleet mix is an element to be considered in the cargo operations forecasting process. The majority of cargo tonnage demand will be carried on either small aircraft resulting in a high

Users: All ATCT's

AIRPORT TRAFFIC RECORD

Mail ORIGINAL of this form to Washington Office, AMS-420 thru Regional Air Traffic Division

Facility Name	Location		12	96	BFI
BOEING ATCT	SEATTLE, WASHINGTON		(1-2)	(3-4)	(5-9)
(10-1) FACILITY TYPE (X one)		Facility Type Changed?	MO	YR	LOCATION IDENT
(11) Approach Control Towers [ ] B. Radar [ ] C. Limited Radar [ ] D. Non-Radar --> (Also submit FAA Form 7230-26)	[X] E. VFR Tower [ ] G. Contract Tower (Continue on reverse)	(12) [ ] Yes	If daily hours of operations have changed, enter new hours		hrs 10ths (77-78) (79)

AIRPORT OPERATIONS COUNT

	ITINERANT					LOCAL				
DAY (15-16)	AC (17-21)	AT (22-26)	GA (27-31)	MI (32-36)	TOTAL ITINERANT	CIVIL (37-41)	MILITARY (42-46)	TOTAL LOCAL	TOTAL OPERATIONS	SPECIAL USE (47-51)
1	2	44	364	4	414	196	0	196	610	
2	16	104	313	0	433	228	2	230	663	
3	41	149	552	2	744	284	0	284	1028	
4	45	120	258	2	425	188	0	188	613	
5	41	155	434	3	633	282	0	282	915	
6	45	172	305	1	523	105	2	107	630	
7	26	94	394	0	514	330	2	332	846	
8	18	51	252	0	321	272	0	272	593	
9	27	110	483	2	622	312	0	312	934	
10	41	149	368	10	568	310	4	314	882	
11	46	177	516	8	747	302	2	304	1051	
12	49	177	389	4	619	308	0	308	927	
13	46	130	285	1	462	165	3	168	630	
14	29	81	595	4	709	622	2	624	1333	
15	17	24	379	4	424	230	0	230	654	
16	31	154	506	4	695	258	0	258	953	
17	56	135	703	2	896	388	0	388	1284	
18	68	168	504	1	741	204	0	204	945	
19	58	154	491	2	705	306	0	306	1011	
20	53	168	361	0	582	266	0	266	848	
21	29	96	394	0	519	336	0	336	855	
22	13	24	341	0	378	438	0	438	816	
23	24	113	162	0	299	124	0	124	423	
24	32	128	105	1	266	106	0	106	372	
25	5	30	81	0	116	6	0	6	122	
26	3	53	41	0	97	0	0	0	97	
27	4	91	58	0	153	2	0	2	155	
28	2	65	134	0	201	48	0	48	249	
29	0	6	14	0	20	4	0	4	24	
30	15	115	194	2	326	62	2	64	390	
31	26	131	192	4	353	112	2	114	467	
TOTAL	908	3368	10168	61	14505	6794	21	6815	21320	

FAA Form 7230-1 (4-85)

RES: AT 7230-99

Computer Form 7230-1 (4-91)

KCSlip4 35076

SEA401621

THIS SIDE
FOR USE BY VFR TOWERS ONLY
(ALL Approach Control Terminals
MUST use FAA Form 7230-26)

ALL VFR Towers recording Instrument Operations on this side MUST COMPLETE	12 (1-2)	96 (3-4)	BFI (5-9)		ADP Control 10-4

INSTRUMENT OPERATIONS						REMARKS
DAY	AC	AT	GA	MI	TOTAL (10-E) (14-1)	
1	2	9	66	0	(16-19) 77	
2	16	47	67	0	(20-23) 130	
3	41	64	113	2	(24-27) 220	
4	45	75	0	0	(28-31) 120	
5	41	74	90	3	(32-35) 208	
6	45	68	56	0	(36-39) 169	
7	26	27	59	0	(40-43) 112	
8	18	5	77	0	(44-47) 100	
9	27	43	90	0	(48-51) 160	
10	41	71	92	0	(52-55) 204	
11	46	71	91	0	(56-59) 208	
12	49	53	127	1	(60-63) 230	
13	46	62	70	4	(64-67) 182	
14	29	23	98	2	(68-71) 152	
15	17	19	54	2	(72-75) 92	
16	31	38	89	0	(76-79) 158	
					(14-2)	
17	56	66	104	1	(16-19) 227	
18	57	0	76	116	(20-23) 249	
19	53	100	78	0	(24-27) 231	
20	29	31	58	0	(28-31) 118	
21	30	31	60	0	(32-35) 121	
22	13	10	59	0	(36-39) 82	
23	24	56	63	0	(40-43) 143	
24	32	107	57	0	(44-47) 196	
25	5	17	16	0	(48-51) 38	
26	3	41	41	0	(52-55) 85	
27	4	36	43	0	(56-59) 83	
28	2	22	51	0	(60-63) 75	
29	0	1	6	0	(64-67) 7	
30	15	55	59	0	(68-71) 129	
31	26	67	65	0	(72-75) 158	
TOT	869	1389	2075	131	4464	
	(17-21)	(22-26)	(27-31)	(32-36)		
1/						

1/ FACILITY USE

Computer Form 7230-11 (4-91)

KCSlip4 35077

SEA401622

ATSDR
AGENCY FOR TOXIC SUBSTANCES AND DISEASE REGISTRY

RICHARD R. KAUFFMAN, M.S.
Regional Representative

1200 Sixth Ave. Suite 1930 (206)553-2632
Seattle, WA 98101 FAX 553-2142
kauffman.richard@epamail.epa.gov

TDD RELAY SERVICE:
1-800-833-6388

Anne Duffy
Public Health Advisor
Federal Assessment Section

Department of Health
Office of Toxic Substances
Airdustrial Center, Bldg 3
PO Box 47825
Olympia, WA 98504-7825

236-3372
360/~~753-1940~~
236-2252 FAX 360/~~586-5529~~
INTERNET:
amd0303@hub.doh.wa.gov

TDD RELAY SERVICE:
1-800-833-6388
tollfree: 1-888-5Toxics

Cindy J. Gleason
Environmental Educator
Federal Assessment Section

Department of Health
Office of Toxic Substances
Airdustrial Center, Bldg 3
PO Box 47825
Olympia, WA 98504-7825

236-3373
360/~~586-5406~~
236-2252 FAX 360/~~586-5529~~
Internet:
cjg2303@hub.doh.wa.gov

KCSlip4 35078

SEA401623